CLAIMS:

1. A digital group delay compensation system comprising:

a digital allpass filter that is utilized in an implementation phase; and

a system that generates coefficients for the allpass filter used in the implementation phase such that the overall performance of a system is measured and optimized in a calibration phase.

2. The system according to claim 1 whereby optimum performance is not directly based on phase response or group delay characteristic.

3. The system according to claim 1 where, in the calibration phase, the definition of optimum overall performance of a system is user configurable and based on the measured amount of risetime, overshoot, and preshoot in the system step response and as such the optimization balances these three characteristics.

4. The system according to claim 1 in which the system that optimizes the performance is a closed loop system comprising:

an optimization element whose output are control variables that it adjusts and whose input is a score of overall system performance based on the output control variables whereby this element adjusts its outputs and examines its input in a manner contrived to maximize the input score;

a specifications generator that converts the optimizer output and optionally, and the measured uncompensated group delay of the system, into to a frequency domain group delay specification;

an allpass filter fitter element that converts the frequency domain group delay specification into allpass filter coefficients such that the frequency domain group delay specifications are compensated with a high degree of compliance;

a stimulus generator that can be attached to the channel input in a manner enabling the measurement of the response of the uncompensated system to this known stimulus;

an allpass filter arrangement containing an allpass filter implementation based on the coefficients provided by the allpass filter fitter element that filters the response of the uncompensated system to a stimulus and produces the response of the compensated system to a stimulus;

a measurer that makes various parameter measurements on the response of the compensated system to a stimulus; and

a grading system that converts the various parameter measurements to a score of overall compensated system performance.

5. The system according to claim 2 in which, in the calibration phase, the response of the uncompensated system to a stimulus is calculated using an internally generated ideal stimulus and the measured uncompensated channel response characteristics.

6. The system according to claim 2 in which, in the calibration phase, the grading system is implemented as a fuzzy logic grading system comprising:

user defined fuzzy membership sets for the parameters measurements produced by the measurer;

a user defined fuzzy rule base that provides grading rules based on the membership of the parameter measurements in the fuzzy membership sets; and

a defuzzification element that produces a single score based on the execution of the rules in the fuzzy rule base.

7. The system according to claim 2 which, in the calibration phase, the allpass filter fitter utilizes the Levenberg-Marquardt algorithm in conjunction with the functions that defines the group delay of allpass filter and the partial derivatives of this function with respect to the filter coefficients and a guess at the coefficient values to calculate filter coefficient values; These coefficient values calculated such that the mean-squared error between a group delay specification provided and the function that defines the group delay of an allpass filter evaluated using said coefficients is minimized.

8. The system according to claim 2 where, in the calibration phase, the response of the uncompensated system to a known stimulus is measured such that the known stimulus passes through additional hardware connected to the channel, such as a probing element, to include the effects of this additional hardware in the compensation.

9. The system according to claim 2 in which, in a calibration phase, the allpass filter arrangement is a polyphase arrangement capable of filtering the response of the uncompensated system to a known stimulus with an allpass filter designed for a different sample rate while preserving the sample rate of the response of the uncompensated system to the known stimulus.

10. The system according to claim 2 whereby the calibration phase is entered periodically allowing dynamic calibration for changing channel response characteristics.

11. The system according to claim 8 whereby the calibration phase is entered periodically allowing dynamic calibration for changing channel response characteristics.

12. The system according to claim 4 whereby the measurements that contribute to the optimization of system performance are provided externally for examination of performance.

13. The system according to claim 11 whereby the measurements that contribute to the optimization of system performance are provided externally for examination of performance.